Development and Implementation of Coastal AIS Network Concepts, With MTS Implications

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AIS - Background

- 1991Draft technical requirements presented at Nav 37. Based on Digital Selective calling technique, 500 reports/hour (ITU-R M. 825).
- 1995 Swedish Maritime organization presents a 4S solution
- 1997Draft Performance standard - AIS, based on Self Organised TDMA.
- 1997ITU WRC allocates two international AIS VHF frequencies; 161 975 MHz and 162 025 MHz.
- 1998 Performance standard - AIS, adopted.

AIS - Background

- 1998 ITU adopts the AIS technical characteristics (ITU-R M.1371), reviewed October 2000 and adopted April 2001 as ITU R M 1371-1.
- 1998 IMO Maritime Safety Committee includes the AIS within SOLAS chapter V, Regulation 19.
- 2001 Final vote for making AIS a IEC standard
- 2002 IMO carriage requirements starts for AIS.

IMO Carriage requirements

- AIS on all new passenger ships and new cargo ship above 300 t constructed after 1 July 2002
- AIS on all passenger ships and tankers on international voyage, 1/7 2003*
- AIS on all cargo ships above 50 000 t, international voyages, 1/7 2004
- AIS on all cargo ships 10 000 - 50 000 t , international voyages, 1/7 2005
- AIS on all cargo ships 3 000 - 10 000 t, international voyages, 1/7 2006
- AIS on all cargo ships 300 - 3000 t, international voyages, 1/7 2007
- AIS on all ships >300 t, not in international voyages, 1/7 2008*

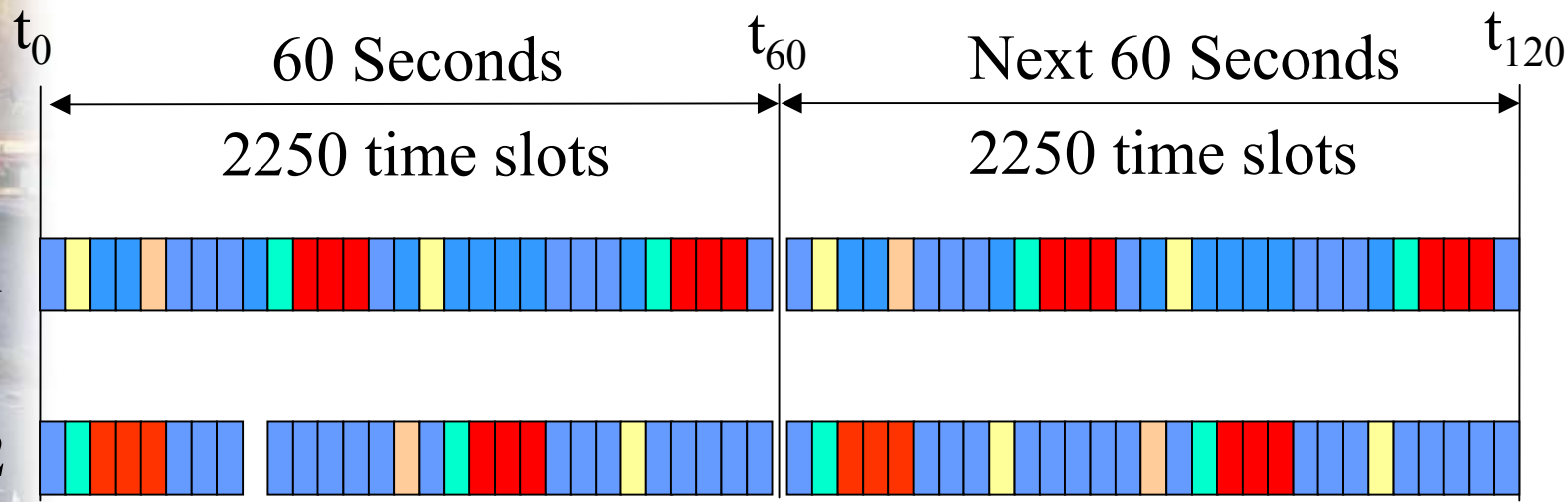
Automatic and continuous broadcast of ships data:

- Dynamic data
- Static data
- Voyage related data
- Safety related data & Text messages

Cellular Concept

- Travelling Cells where communication is automatically synchronised and information is passed automatically

STDMA

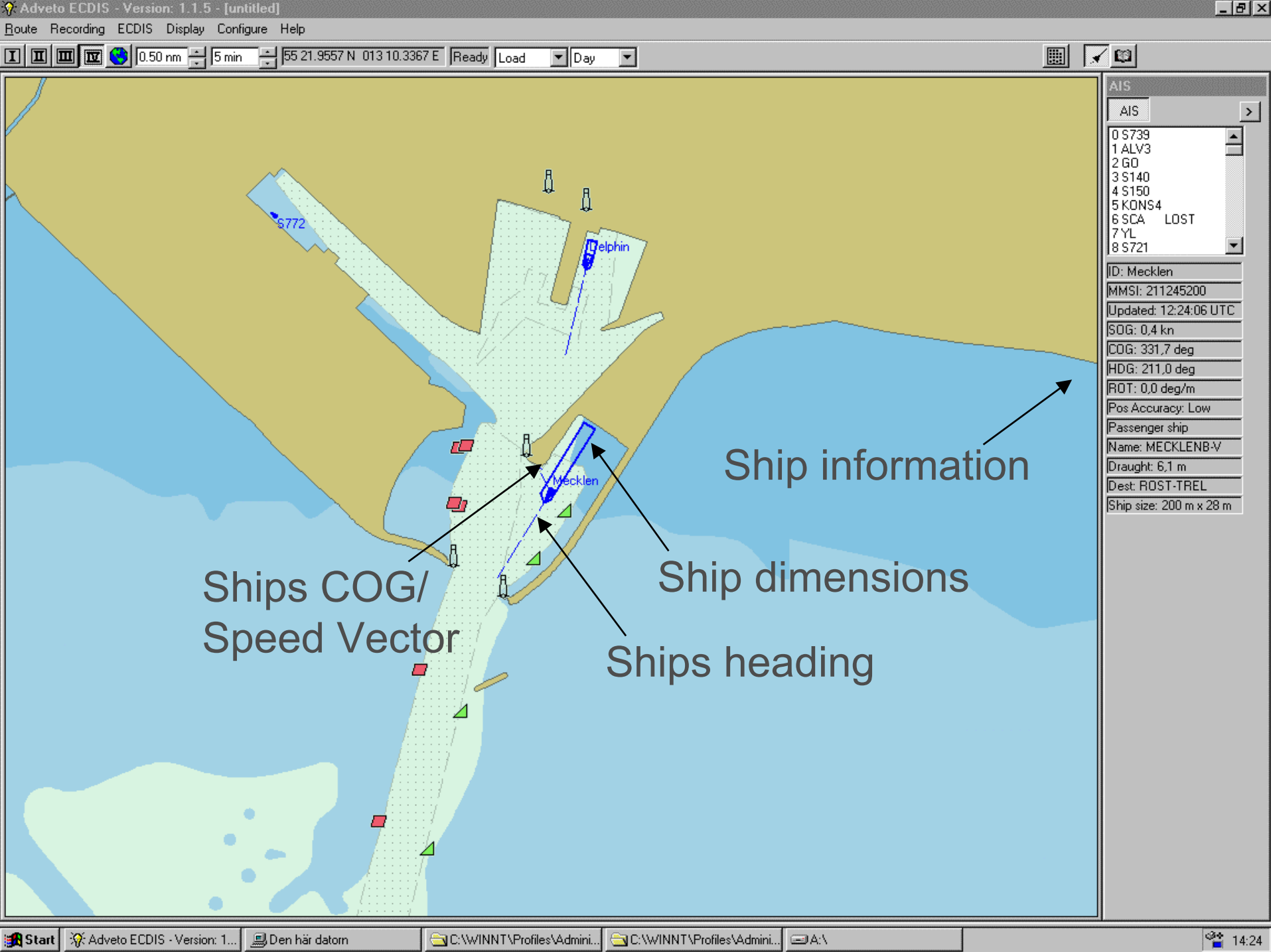


A time slot is 26.67 ms long
and contain 256 bits of data

One time slot is large enough to host all information in a position report (ships dynamic data)

Dynamic data

- MMSI number
- Position (latitude/longitude in WGS 84)
- Course and speed over ground
- Heading
- Rate of turn
- Navigational status
- Position accuracy


Adveto ECDIS - Version: 1.1.5 - [untitled]
Route Recording ECDIS Display Configure Help
0.50 nm
5 min
55 21.9557 N 013 10.3367 E
Ready
Load
Day
AIS
AIS
0 S739
1 ALV3
2 GO
3 S140
4 S150
5 KONS4
6 SCA LOST
7 YL
8 S721
ID: Mecklen
MMSI: 211245200
Updated: 12:24:06 UTC
SOG: 0,4 kn
COG: 331,7 deg
HDG: 211,0 deg
ROT: 0,0 deg/m
Pos Accuracy: Low
Passenger ship
Name: MECKLENB-V
Draught: 6,1 m
Dest: ROST-TREL
Ship size: 200 m x 28 m
S772
Delphin
Mecklen
Ship information
Ship dimensions
Ships COG/
Speed Vector
Ships heading
Start
Adveto ECDIS - Version: 1...
Den här datorn
C:\WINNT\Profiles\Admini...
C:\WINNT\Profiles\Admini...
A:\
14:24

Report rate of Dynamic data

Speed (knots)	Update rate	Increased rate
0 - 14	10 seconds	$3^{1}/_{3}$ seconds
14 - 23	6 seconds	2 seconds
23 +	2 seconds	2 seconds
At anchor	180 seconds	

Increased rate when ship turning more than 10 degrees/min.

Static data

- MMSI and IMO Number
- Name of the ship
- Call sign
- Length and Beam
- Type of Ship
- Location of the GPS antenna on the ship

Voyage related data

- Ships draught
- Type of cargo
- Destination
- Estimated time of arrival

Voyage and static data are updated once every 6 minutes or on request (interrogation)

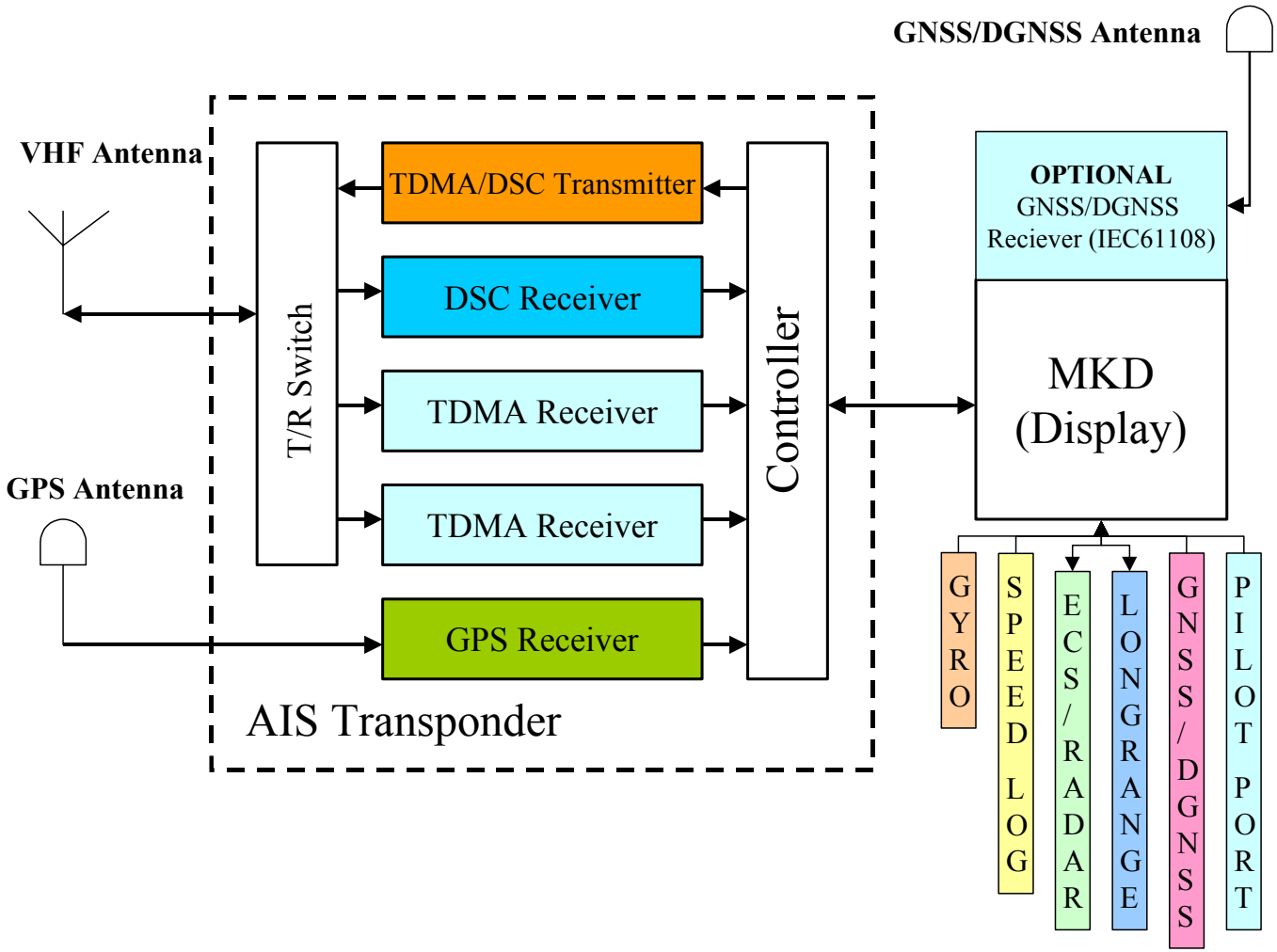
AIS

AIS provides:

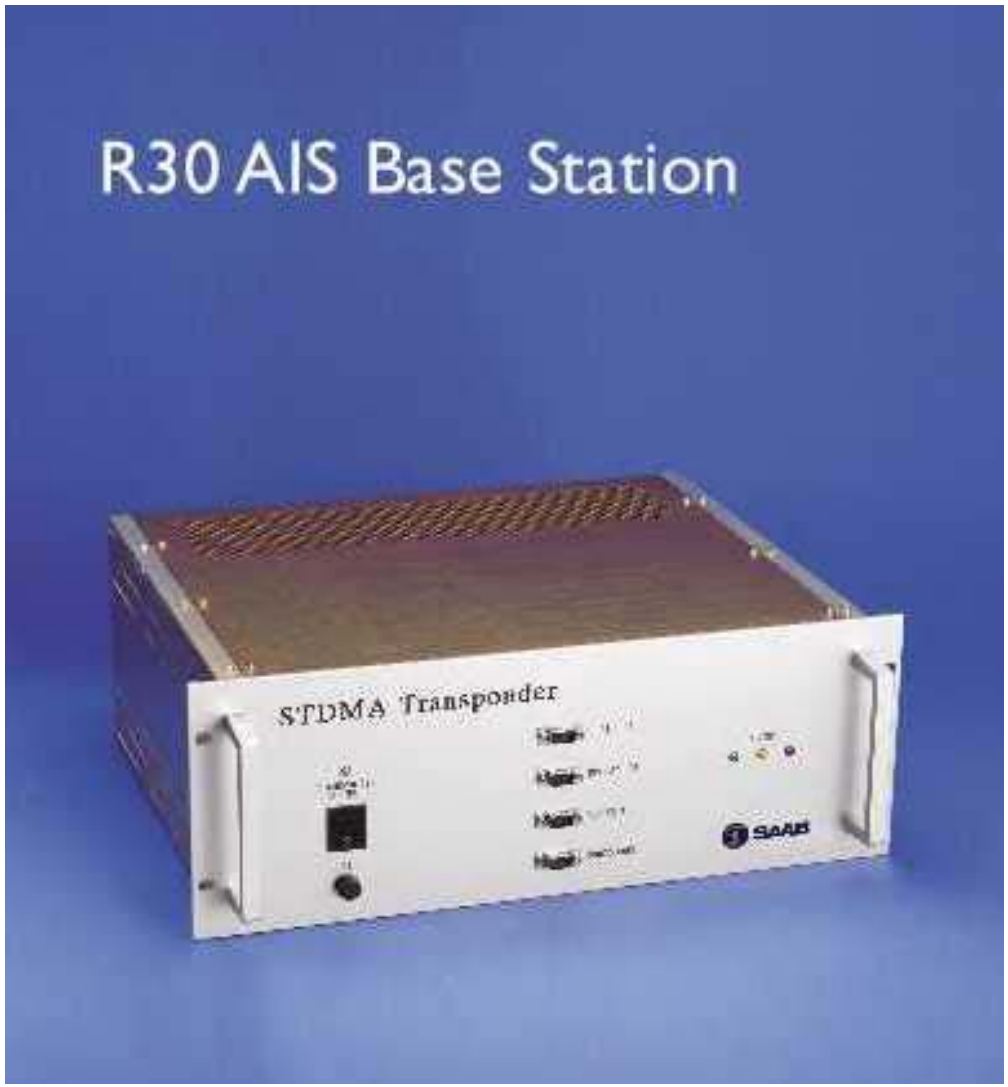
- Real-time presentation
- Identification
- Communication by using Binary and Text messages

AIS Transponder

AIS Transponder

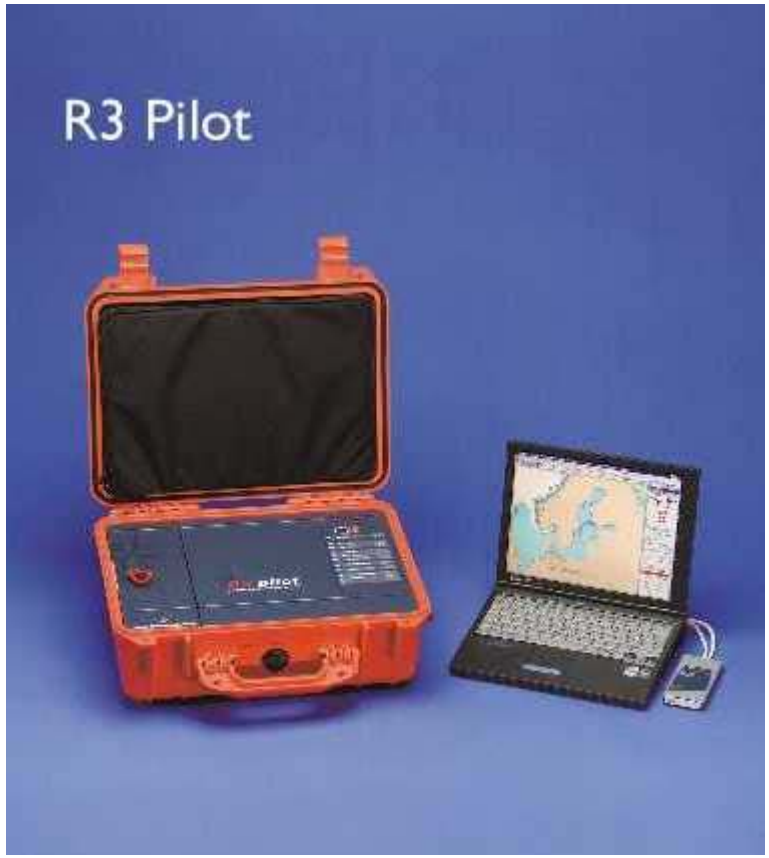


AIS Base Station

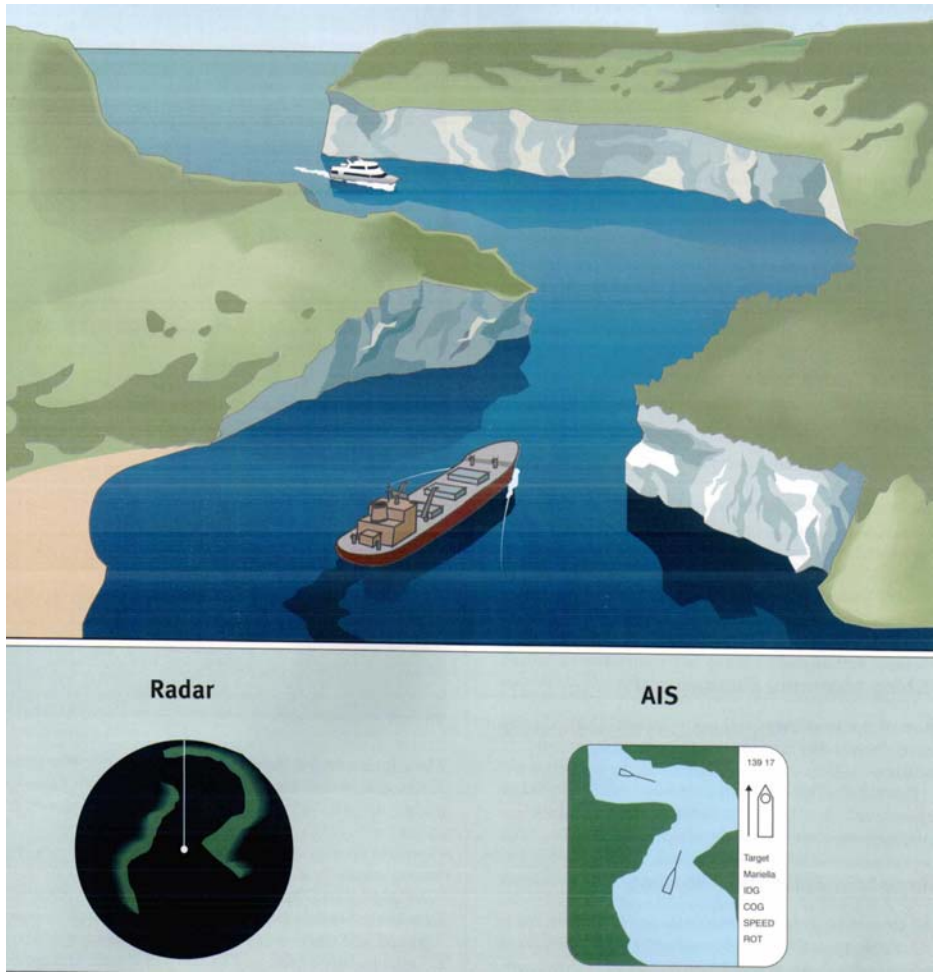


AIS Portable

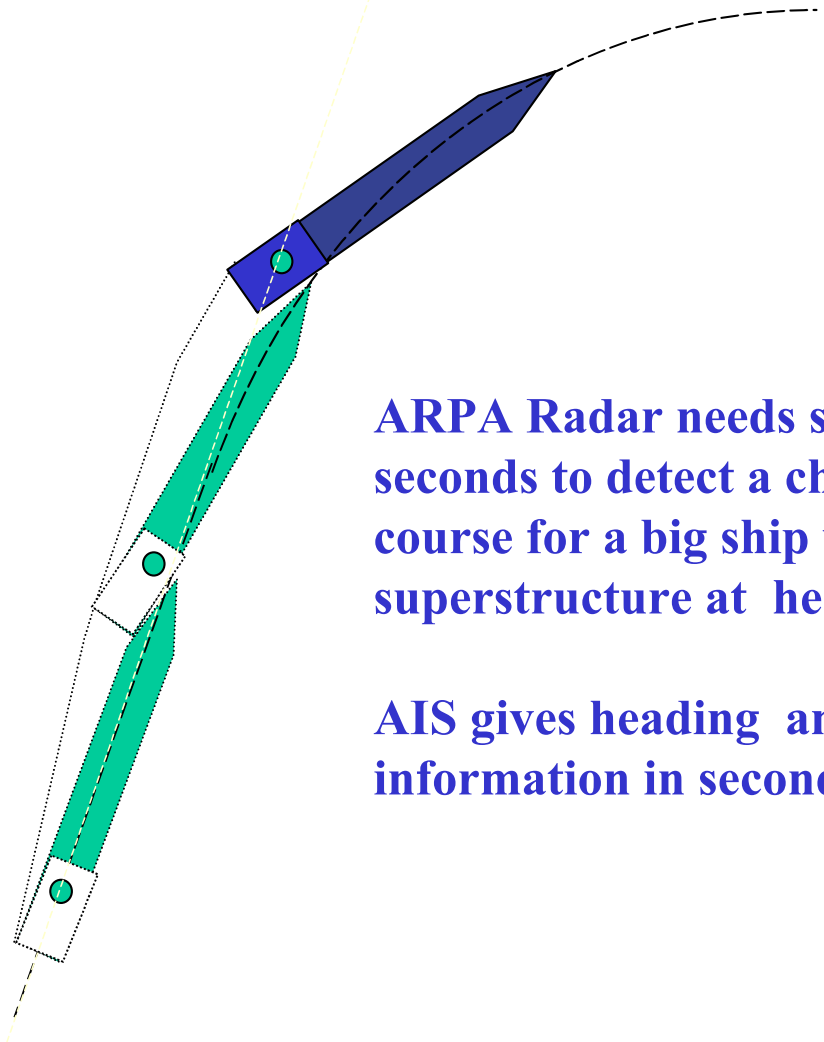
- Rugged case
- Watertight
- Built in DGPS
- Wireless modem connection to chart system



AIS Benefits



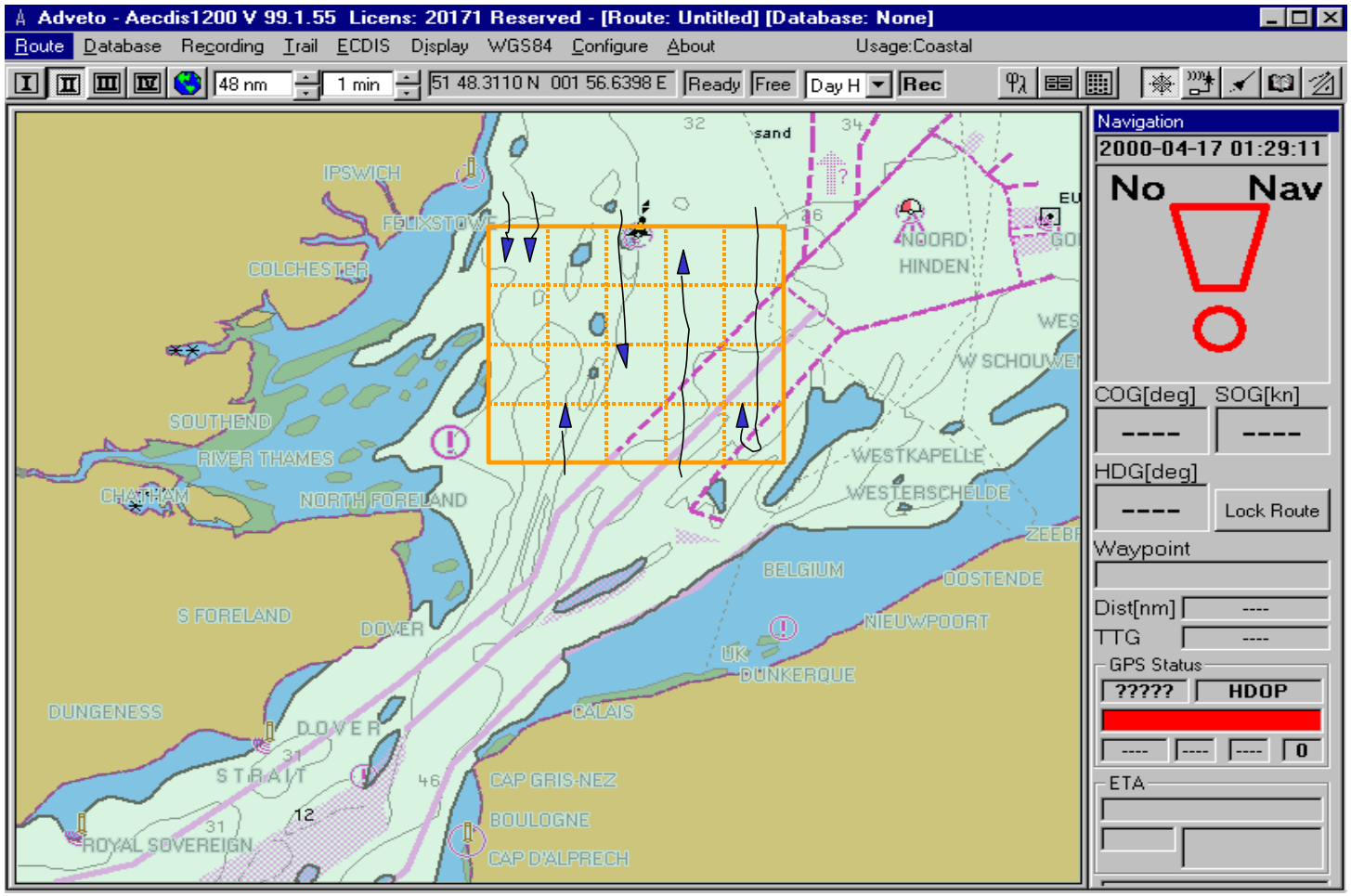
AIS Benefits



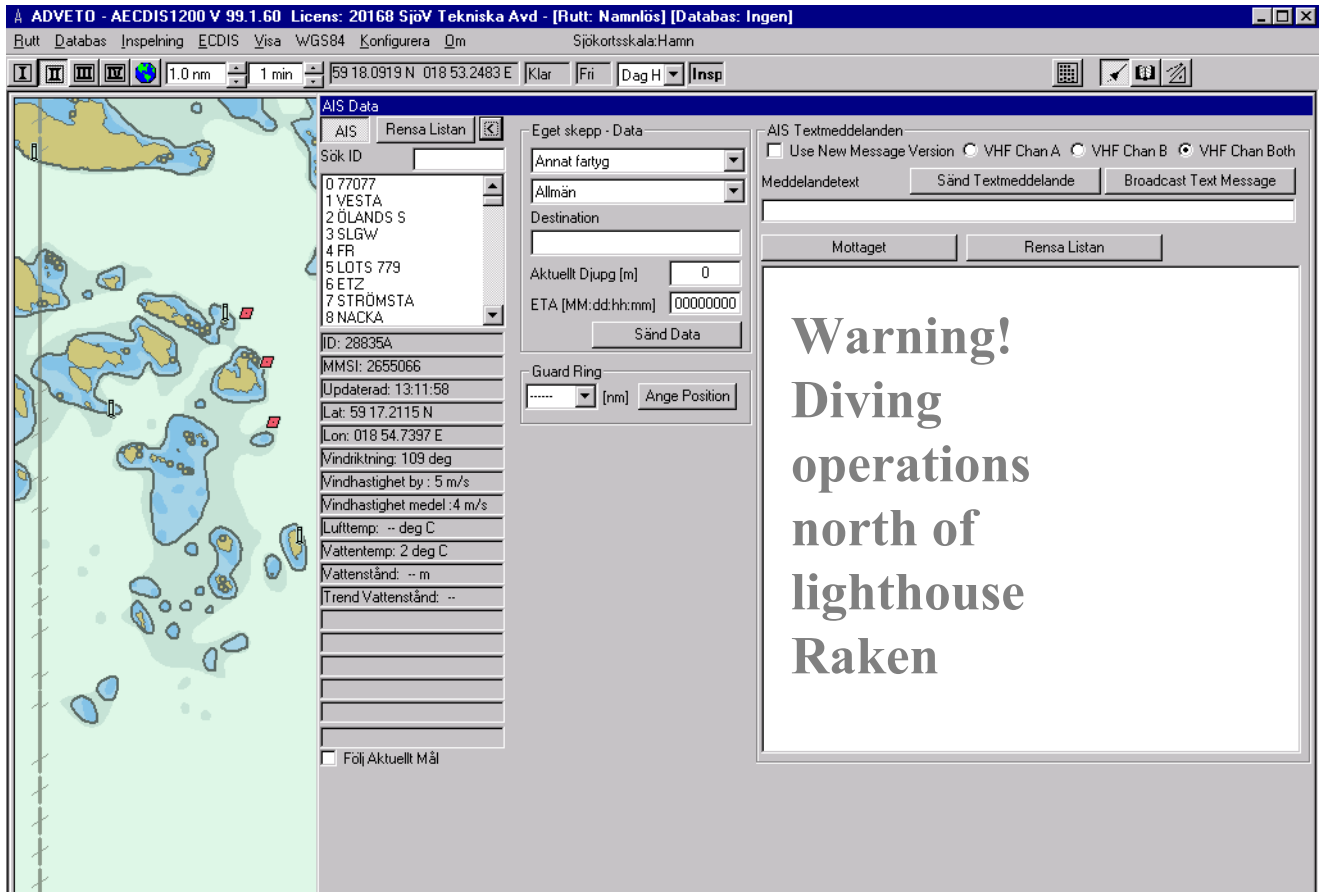
ARPA Radar needs several seconds to detect a change of course for a big ship with her superstructure at her stern.

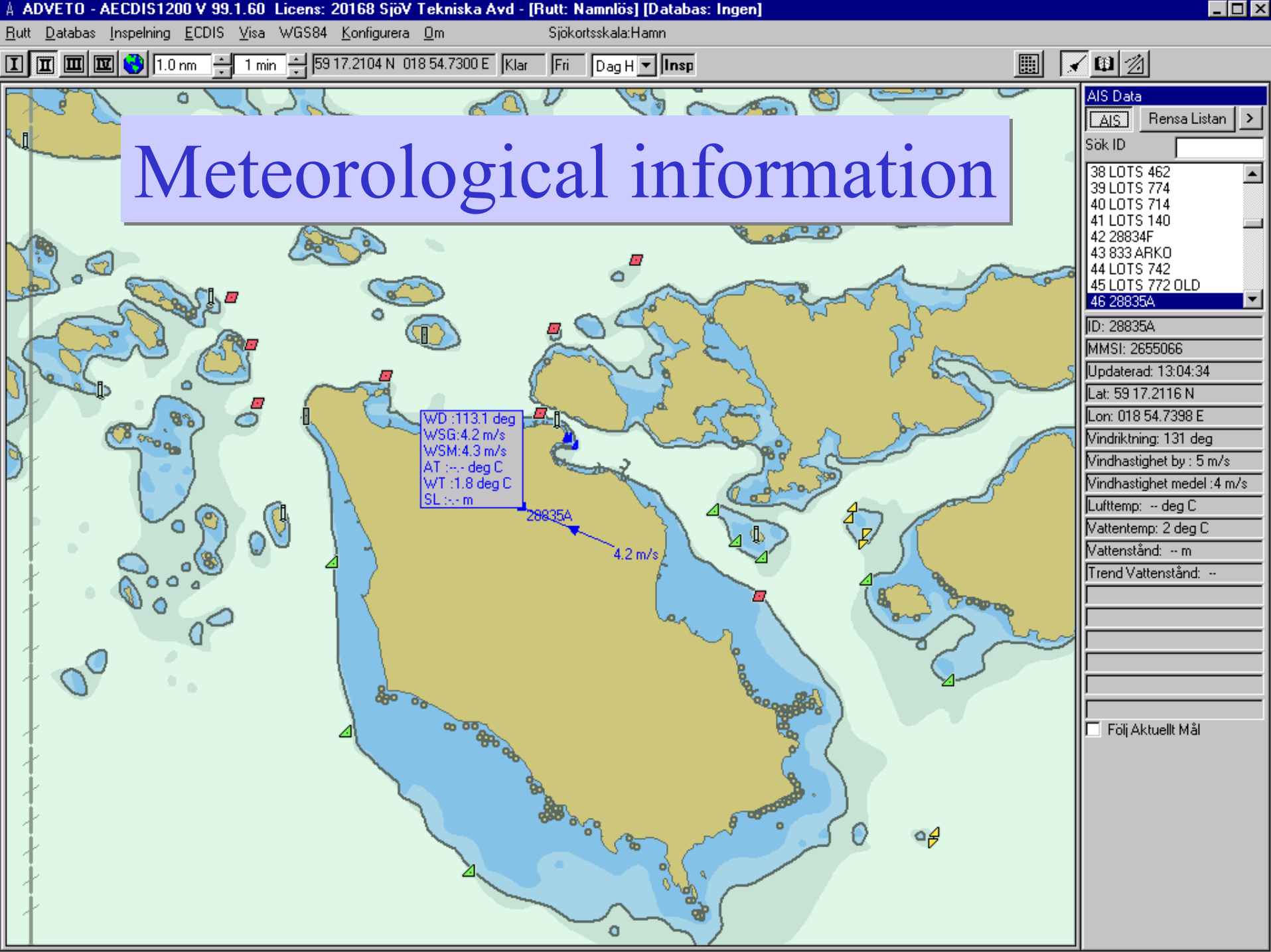
AIS gives heading and ROT information in seconds

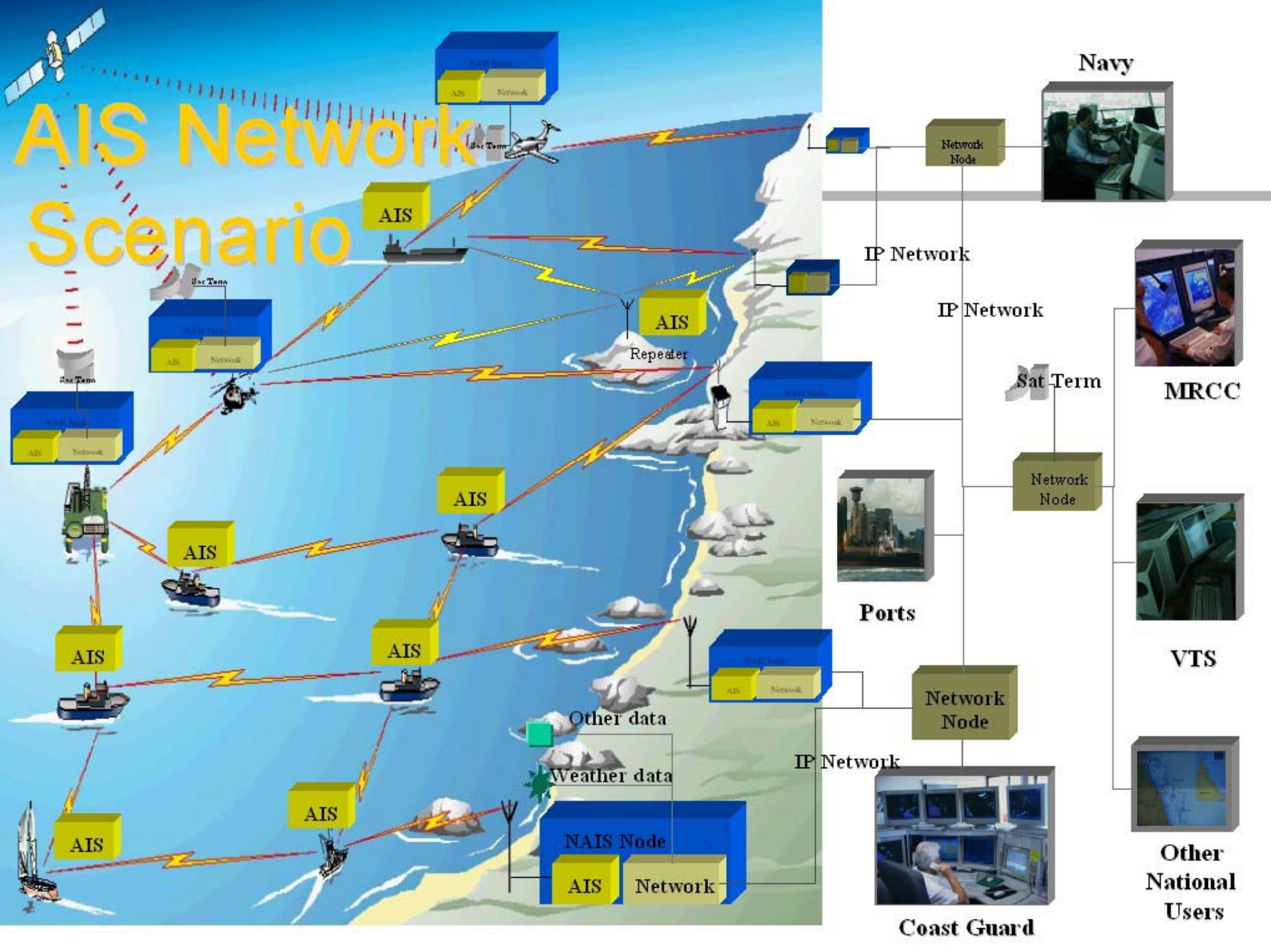
AIS Benefits



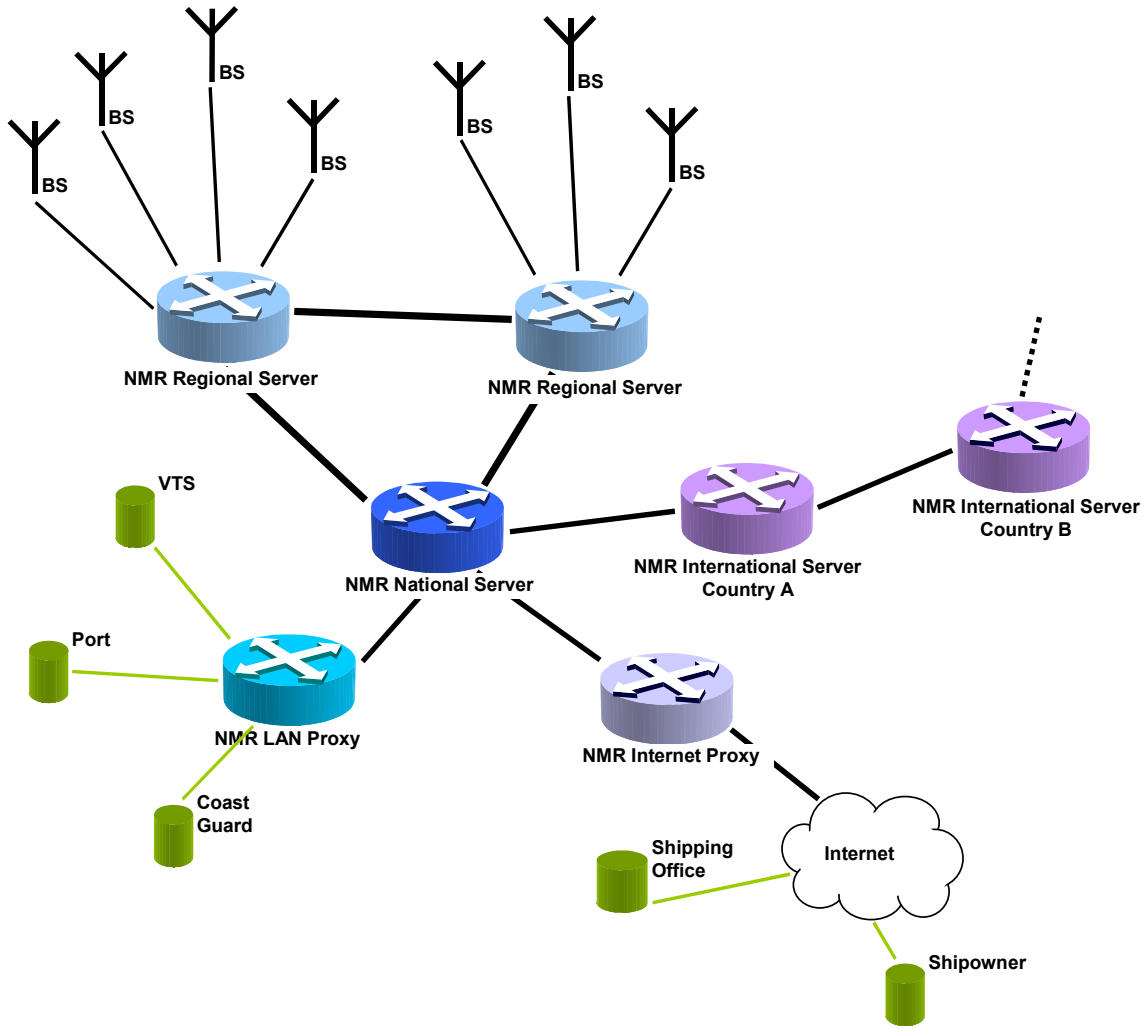
AIS Benefits



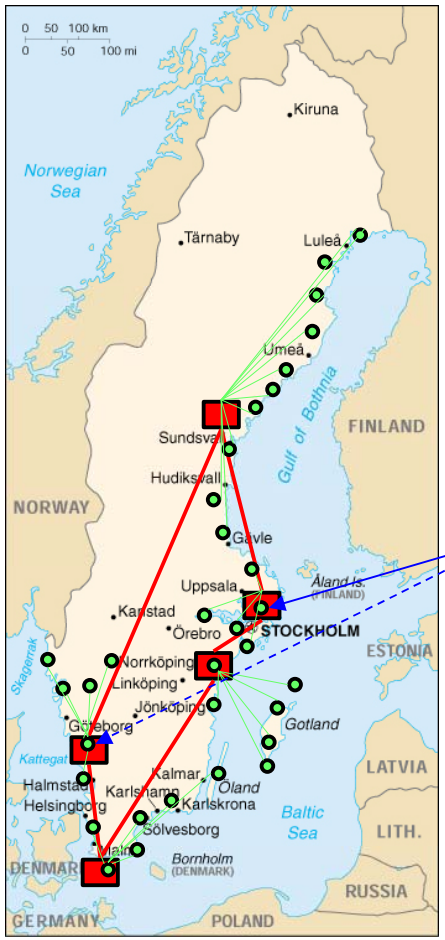

ADVETO - AECDIS1200 V 99.1.60 Licens: 20168 SjöV Tekniska Avd - [Rutt: Namnlös] [Databas: Ingen]
Rutt Databas Inspelning ECDIS Visa WGS84 Konfigurera Om
Sjökortsskala:Hamn
1.0 nm
1 min
59 17.2104 N 018 54.7300 E
Klar
Fri
Dag H
Insp
Meteorological information
AIS Data
AIS
Rensa Listan
Sök ID
38 LOTS 462
39 LOTS 774
40 LOTS 714
41 LOTS 140
42 28834F
43 833 ARKO
44 LOTS 742
45 LOTS 772 OLD
46 28835A
ID: 28835A
MMSI: 2655066
Updaterad: 13:04:34
Lat: 59 17.2116 N
Lon: 018 54.7398 E
Vindriktning: 131 deg
Vindhastighet by : 5 m/s
Vindhastighet medel :4 m/s
Lufttemp: -- deg C
Vattentemp: 2 deg C
Vattenstånd: -- m
Trend Vattenstånd: --
Följ Aktuellt Mål
WD :113.1 deg
WSG:4.2 m/s
WSM:4.3 m/s
AT :-.- deg C
WT :1.8 deg C
SL :-.- m
28835A
4.2 m/s


AIS Network Scenario
Navy
Network Node
IP Network
IP Network
MRCC
Sat Term
Network Node
Ports
VTS
Network Node
IP Network
Other National Users
Coast Guard
AIS
Repeater
Other data
Weather data
NAIS Node
AIS
Network

AIS Network Solution



AIS Network Solution



AIS Network in Sweden

NMR-500 & NMR-800

2 MBit/s backbone

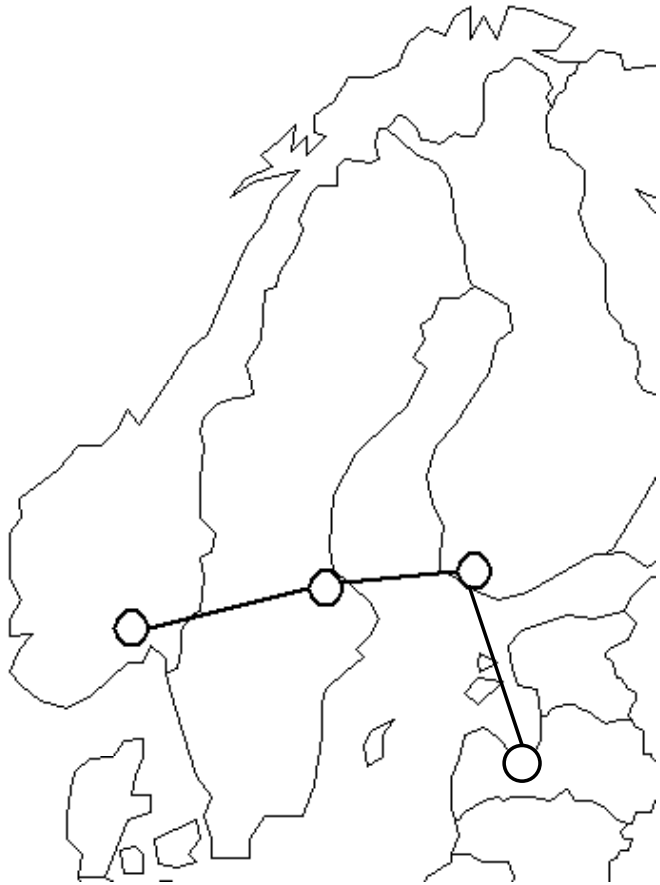
BS / BSC (35 pcs)

64KBit/s or synchronous 38.4 KBit/s

NMR-1000 & NMR-1800

Backbone load / traffic intensity in Sweden:
- Today (with 200 mobiles pos. rep. only) : 20 KBit/s
- Future (with 1500 mobiles pos. rep only) : 150 Kbit/s
- Full load with 35 BS/BSC : 1.4 MBit/S

AIS Network Solution



Also with AIS

- Aids to Navigation
  - Status of Lights
  - Status of Racon
  - Position Indicator
  - Local parameters
- Non SOLAS ships

Conclusion

- The AIS provides an improved method of vessel traffic surveillance and control
- AIS provides many new different applications (Your imagination) but a network is required for easy access and safe distribution
- AIS will be implemented in the near future in your coastal areas